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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,264	08/28/2003	Armin Schoisswohl	134360	6592

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Dean D. Small
Armstrong Teasdale LLP
Suite 2600
One Metropolitan Square
St. Louis, MO 63102

EXAMINER	
JAWORSKI, FRANCIS J	

ART UNIT	PAPER NUMBER
3737	

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/650,264	SCHOISSWOHL ET AL	
	Examiner	Art Unit	
	Jaworski Francis J.	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *28aug2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor

and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

[Parenthesized claim numbers pertain to the specific claim or claims being addressed by the immediately preceding rejection argument.]

Claims 1-7, 18 – 19, 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Clark (US6139500).

Clark is directed to a system and structure for performing a slow-time volumetric 3D scan of the heart including identifying the(systole and diastole) time intervals of the heart cycle movement by the ECG-wave, and re-arranging (termed re-sorting) the fast time scan planes which are obtained at intervals during the slow-time mechanical volume sweep, see col. 7 lines 12-49 and col. 9 lines 21 – 29. (Claim 1).

The time re-alignments associated with interval variation compensation (col. 5 lines 30 – 50) as well as during the 'available departure time technique' serve as a subset sorting and a combining basis for the assembled volume scan out of its volume increments, see col. 8 line 36 – col. 9 line 47.(Claims 2,6, 23).

While the fast-time scan planes are less temporally dependent, all of the volumetric data as represented by Figs. 5 is both spatial in that it images 2D anatomy in the unit form and spatio-temporal in that finite time is elapsing along the abscissa which affects the re-orderings and alignments. (Claim 3).

The anatomic mode of Clark is termed 'B-mode' by definition by this art since it is an intensity image of depth versus scan sweep. (Claim 4).

Each mechanical scanhead displacement sweep vertically in the Fig. 5 set is a unit slow-time single-direction sweep and is repeated at the ADT time intervals.. (Claims 5, 7).

The volume reconstruction of the heart for this technique is memory-based, see col. 4 lines 24-33. (claims 18-19).

Claims 1-8, 10-12, 14–20, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clark in view of Pang et al (US6190321), alone or further in view of (a) Powers et al (US5099847) and Urbano et al (US5976088) or (b)Sheehan et al (US5570430) and. The former is applied as above, however with note that under the anticipatory interpretation the Examiner is essentially opposing patentability under the interpretation that language 'identifying a time interval....object' at end-claims 1 and 18 reads against conventional ECG triggering, however for purposes of this argument the secondary teachings are being used to establish that under the interpretation that this phraseology does indeed pertain to synchronizing triggering based upon movement within the image i.e. based upon imaging data and without use of an ancillary ECG electrode sensor on the subject, then this was a known equivalent to the latter, albeit Clark is silent as to the equivalence.. Hence Pang et al which is directed to on the one hand EFOV Doppler imaging or on the hand to 3D imaging, apparently for the analogy that both require image buildup from component

scanplane images over time (see col. 1 Summary) state that movement-representative color Doppler image data itself may serve as the synchronizing trigger (see col. 9 lines 10-28). In the alternative, if it be argued that this combination yet falls short because Clark is a B-mode not a Doppler-based motion scanner, then it would have been obvious in view of Powers et al col. 5 lines 30-32 that image regional brightness is in turn an equivalent to a Doppler-based image-derived trigger, or as supplemented by Urbano et al col15 line 63 – col. 17 line 59 showing how tailored frame rate acquisitions obtained by re-sort/re-arranging of scanplane data over multiple heart cycles may occur, or in view of Sheehan et al col. 10 lines 39-43 that for a suitable ROI chosen in Powers et al the maximum brightness directly suggests the end-systole point, (Powers et al is 2D –confined to rate enhanced imaging; Sheehan et al is focused on LV contouring, however both are cardiologic imaging references faced with the problem of re-sorting scanplane data from uni-directional slow-sweeps into volume subsets of memory in light of the changing circumstance of heart contraction. (Claims 1-7, , 14-19, 23).

The aforementioned peak intensity or maximum brightness techniques of the latter would require comparison of data and would extend over plural heartbeat cycles soas to define the heartbeat interval for the purposes of Clark. (Claims 8, 10, 20).

The secondary references involve templates to the extent that the brightness determinations are based upon selected regions of image points and/or patterns within the image data. (claims 11-12).

Claims 9, 13, 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 18 immediately above, and further in view of Bonnefous(US6647135) since whereas the former are silent as to plural points of interest used in autocorrelating and sum-averaging, it would have been obvious in view of the latter col. 7 lines 35-61 and col. 8 lines 37-50 to derive both blood flow and wall movement markers as a summed average representative values of heart cycle phase over the duration of the time interval in order to synchronize image re-sorting, or a Doppler power spectral analysis equivalent, see col. 5 bottom.. (Claims 21-22)..

Claims 8, 10, 12, 15-17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Powers et al (US5099847).

Under the anticipatory interpretation, Powers et al teach:

a method of acquiring a high frame rate diagnostic image of the heart by acquiring at least two time series (12 and 16) of scan planes (14 and 18) during a multiple heart cycle image acquisition interval with frames obtained in either a triggered or untriggered mode by the ultrasound imager, in realtime or in a freeze mode with playback from memory,

identifying a feature across the scan planes (image feature brightness, see col. 5 lines 28 – 32),

comparing intensity values of the feature between (within) the series – a maximum brightness for each heart cycle is determined and therefore it is inherent that a comparison of brightnesses is taking place,

identifying the maximum brightness or intensity for each of the at least two time series as a temporal alignment marker, and

interleaving therefore rearranging the two series of scan planes based upon the temporal location of the maximum brightnesses soas to form a doubling of scan frame number soas to support high frame rate imaging.

In the alternative, if it be argued that an 'image feature' need not be geometrically constant and therefore not be a 'common point of interest' in Powers et al (meaning that different points in the two respective image series could be self-compared to other such points within the respective sets for example) then it would have been inherently obvious to perform a comparison based on a generally common point in order that the maximum brightness occur at the same time at the onset of the respective series being interleaved.. (Claims 8, 17).

The Powers et al system acquires image frames in the realtime mode by tracking cardiac interval or inversely the heart rate. (Claim 10).

Since Powers et al operate over two or more such frame series the number of points of maximum brightness would be every 8 points for the 16-frame interleave of Fig. 2. (Claim 12).

In the freeze frame mode of Col. 5 lines 14 – 24, the scan planes are first stored in memory and then retrieved for the interleave formation.(Claim 15).

Each frame is scanned once in a given direction. (claim 16).

Claims 9, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Powers et al as applied to claim 8 above, and further in view of Bonnefous (US6647135). Powers et al is silent as to autocorrelation use in order to derive the intensity extrema of maximum brightness. However in Bonnefous.as per the SUMMARY para, that inventor is seeking to trigger based upon image features alternative to use of the external ECG for vascular time epoch studies, whereupon both the Doppler velocity and the wall motion upon which respective synchronizing time markers of 310, 320 are based use correlation to determine extrema (see col. 4 lines 51 – 63 and col. 5 lines 52-65 as well as col. 7 lines 35-46). It would have been obvious to use same in Powers et al since Bonnefous is addressing a similar problem of aggregating image frames across multiple heart cycles which necessitates this synchronization, see col. 8 line 25 – col. 9 line 13. Arguments are otherwise as provided re Bonnefous above.(Claims 9, 13).

Any inquiry concerning this communication should be directed to Jaworski Francis J. at telephone number 571-272-4738

FJJ:fjj

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Francis J. Jaworski
Primary Examiner